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DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

[RR08100000, 16XR0680A1, RY.1541CH20.60IR161]

Announcement of Requirements and Registration for a Prize Competition Seeking:

Detecting the Movement of Soils (Internal Erosion) Within Earthen Dams, Canals, Levees, and their Foundations.

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice.

SUMMARY: The Bureau of Reclamation, in collaboration with the U.S. Army Corps of Engineers, is seeking new methods for detecting the movement (erosion) of soils in earthen structures and foundations. These methods may detect internal erosion either directly or indirectly (detecting properties that typically indicate internal erosion is taking place). The goal is to detect soil movement earlier than occurs by current visual inspection and instrumentation methods.

DATES: Listed below are the specific dates pertaining to this prize competition:

1. Submission period begins on [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].
2. A webinar concerning this prize competition will be held on [INSERT DATE 7 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

Instructions for participating in the webinar are included in the on-line postings at the addresses shown below. The webinar will also be recorded and posted at these same addresses.

3. Submission period ends on [INSERT DATE 40 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

4. Judging period ends on [INSERT DATE 100 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

5. Winners announced by [INSERT DATE 120 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: The *Detecting the Movement of Soils (Internal Erosion) Within Earthen Dams, Canals, Levees, and their Foundations* Prize Competition will be posted on the following crowd-sourcing platforms where Solvers can register for this prize competition:

1. The Water Pavilion located at the InnoCentive Challenge Center:

<https://www.innocentive.com/ar/challenge/browse>.

2. U.S. Federal Government Challenge Platform: www.Challenge.gov.

InnoCentive, Inc. is administering this challenge under a challenge support services contract with the Bureau of Reclamation. Challenge.gov will re-direct the Solver community to the InnoCentive Challenge Center as the administrator for this prize competition. Additional details for this prize competition, including background information, figures, and the Challenge Agreement specific for this prize competition, can be accessed through either of these prize competition web addresses. The Challenge Agreement contains more details of the prize competition rules and terms that Solvers must agree with to be eligible to compete.

FOR FURTHER INFORMATION CONTACT: Challenge Manager: Dr. David Raff, Science Advisor, Bureau of Reclamation, (202) 513-0516, draff@usbr.gov; Dr. Bobbi Jo Merten, (303) 445-2380, bmerten@usbr.gov.

SUPPLEMENTARY INFORMATION: The Bureau of Reclamation (Reclamation) is announcing the following prize competition in compliance with 15 U.S. Code 3719, Prize Competitions.

PRIZE COMPETITION SUMMARY: According to the American Society of Civil Engineers' 2013 Report Card for America's Infrastructure, there are nearly 160,000 kilometers of levees and 85,000 dams that provide flood protection, water storage, and hydropower services for millions of people in the United States. Many of these dams are owned and operated by Reclamation or the U.S. Army Corps of Engineers (USACE). The USACE also owns and manages a significant portion of the nation's levee inventory. There are also thousands of kilometers of water delivery canals in the United States, with Reclamation owning about 13,000 kilometers of such. Some of these structures are over one-hundred years old, so it is important to ensure that the structures are sound, performing well, and able to continue providing the critical services of storing water, delivering water, and flood protection.

Both Reclamation and USACE monitor, inspect, and assess the condition and performance of dams and other earthen embankments. While inspection and condition assessment programs are effective ways to protect the public and property, these current methods are resource intensive and cannot reliably detect internal erosion early in the process. Internal erosion can take place over a long period of time, but often remains invisible (inside or below the structure) until serious damage occurs, placing lives, property, critical water supply or flood retention capabilities at risk. The ability to reliably detect internal erosion early in the process would help Reclamation, USACE, and all dam, levee, and canal owners to reduce risks by encouraging early-intervention.

There are several internal erosion mechanisms, but all involve the movement of soil to an exit point. If soil movement can be detected and localized inside the structure in the early stages of erosion, flaws could be mitigated and failures prevented. A solution is being pursued through a prize competition because the Bureau of Reclamation and the collaborating Federal agencies view it beneficial to seek innovative solutions from those beyond the usual sources of potential solvers and experts that commonly work in the geotechnical engineering domain. We find ourselves often wondering if someone, somewhere, may know a better way of detecting internal erosion in embankments than the methods we currently use. The prize competition approach enables us to reach a new source of potential Solvers to generate new and timely solutions that would not likely be accomplished by standard contractual methods.

This is an Ideation Challenge, which has the following unique features:

- There is a guaranteed award. The awards will be paid to the best submission(s) as solely determined by the Seeker. The total payout will be \$20,000, with at least one award being no smaller than \$5,000 and no award being less than \$2,500.
- ALL INTELLECTUAL PROPERTY RIGHTS, IF ANY, IN THE IDEA OR CONCEPT DEMONSTRATED BY THE PROPOSED SOLUTION WILL REMAIN WITH THE SOLVER. UPON SUBMISSION OF A PROPOSED SOLUTION TO THIS CHALLENGE, EACH SOLVER GRANTS TO THE SEEKER A ROYALTY-FREE, PERPETUAL, IRREVOCABLE, NON-EXCLUSIVE LICENSE AND RIGHT TO USE, DISCLOSE, REPRODUCE, PREPARE DERIVATIVE WORKS, DISTRIBUTE COPIES TO THE PUBLIC, AND PERFORM PUBLICLY AND DISPLAY PUBLICLY, IN ANY MANNER AND FOR ANY PURPOSE, AND TO HAVE OR

PERMIT OTHERS TO DO SO. NOTWITHSTANDING GRANTING THE SEEKER A PERPETUAL, NON-EXCLUSIVE LICENSE FOR THE PROPOSED SOLUTION, THE SOLVER RETAINS OWNERSHIP OF THE IDEA OR CONCEPT DEMONSTRATED BY THE PROPOSED SOLUTION.

- The Seeker believes there might be a potential for future collaboration with awarded Solver(s), although such collaboration is not guaranteed. The Seeker may also encourage Solver(s) to further develop and test their winning submissions through subsequent round(s) of competition. Solvers should make it clear if they have the ability for subsequent design and development phases and would be willing to consider future collaborations and/or subsequent competitions.

Technical Requirements. Any proposed solution should address some or all of the following technical requirements. You must meet requirement No. 5 but need not meet all other requirements to be eligible for an award.

1. Provide a 3D spatial representation of the earthen structure and associated foundation (to a depth equal to the height of the embankment), identifying zones of active internal erosion.

- a. Levees and canals are relatively lower in height (~1 to 3 meters), but longer in length (1000+ meters).

- b. Dams are relatively greater in height (up to 100+ meters), but shorter in length.

2. Detect internal erosion before it is visible at the ground surface. A zone (volume) of unstable moving particles on the order of 1 cubic meter at any location within or under the embankment is considered significant for the internal erosion process. Methods that can detect the movement of smaller volumes of particles are preferred.

3. Allow for a time lapse monitoring interval on the order of weeks to months. Preferably the monitoring of the embankment would be continuous and provided with alarm capability based on predefined thresholds.

4. Quantify a rate of particle movement, preferably a rate of growth of internal erosion features.

5. NOT compromise the structural integrity of the embankment or foundation materials; it must be environmentally inert, and must adhere to a philosophy of “do no harm”.

Although direct measures of internal erosion are preferred, indirect measurements of internal erosion, such as approaches that monitor changes to the phreatic surface or saturation of the embankment will be considered as well.

PROJECT DELIVERABLES: This is an Ideation Challenge that requires only a written proposal to be submitted. At least one solution will be deemed the winner. The submission should include:

1. Detailed description of a direct or indirect method for detecting internal erosion that is not widely used today. Only significant improvements to existing methods will be considered for award.

2. Rationale for why the method can meet the technical requirements above. Note: a general concept is needed, but is not considered a solution by itself. The Solver must describe with “a high level of technical detail” how the system would meet or not meet each of the attributes described above. The Solver should expect that their submittal will be reviewed by experts in multiple fields of engineering and science. Examples and literature references of where similar techniques are used and how they are used will be

helpful to support the validity of the solution.

3. A list of equipment and materials is required. Discussion should include expected lifetime of any equipment; size and invasiveness to the embankment structure; detection speed, accuracy and estimated costs.

4. The Solver needs to describe how deployable and workable the system would be under a wide variety of environmental conditions such as those found in typical dam, levee and canal embankments.

The discussion accompanying the Solver's proposal should:

5. Clearly identify detection limits of methods, such as: What is the minimum size of soil particle the method can detect? Does the baseline condition of the embankment, groundwater, or ambient environment impact the performance of the method?

6. Identify how and where the method will be installed. Is the method weather proof and tamper proof? Are there any limitations to the method installation or conditions required for performance?

7. Identify the temporal resolution or temporal limitations of the solution. How long does the method take to deploy? What are measurement and processing time limitations?

Submitted proposals should not include any personally identifiable information that the Solver does not want to make public, or any information that the Solver may consider as their own Intellectual Property which they do not want to share.

JUDGING: After the Challenge deadline, the Seeker will evaluate the submissions and make a decision with regards to the Winning Solution(s). All Solvers that submitted a proposal will be notified on the status of their submissions; however, no detailed evaluation of individual submissions will be provided. Decisions by the Seeker cannot be

contested.

Submitted solutions will be evaluated by a Judging Panel composed of scientists, engineers, and other technical experts. The Judging Panel will also have consultation access to technical experts outside of their expertise, as deemed necessary, to evaluate specific submissions. The Judging Panel will assess the merits of the solution by the degree upon which they meet the technical requirements provided above, by the potential utility (i.e., adaptability, scalability, readiness for development), and by originality (i.e., novel extension of current knowledge).

ELIGIBILITY RULES: To be able to win a prize under this competition, an individual or entity must:

1. Agree to the rules of the competition (15 U.S. Code § 3719(g)(1));
2. Be an entity that is incorporated in and maintains a primary place of business in the United States, or (b) in the case of an individual, a citizen or permanent resident of the United States (15 U.S. Code § 3719(g)(3));
3. Not be a Federal entity or Federal employee acting within the scope of their employment; (15 U.S. Code § 3719(g)(4));
4. Assume risks and waive claims against the Federal Government and its related entities (15 U.S. Code § 3719(i)(1)(B)); and,
5. Not use Federal facilities, or consult with Federal employees during the competition unless the facilities and employees are made available to all individuals and entities participating in the competition on an equitable basis.

The following individuals or entities are not eligible regardless of whether they meet the criteria set forth above:

1. Any individual who employs an evaluator on the Judging Panel or otherwise has a material business relationship or affiliation with any Judge.
2. Any individual who is a member of any Judge's immediate family or household.
3. The Seeker, participating organizations, and any advertising agency, contractor or other individual or organization involved with the design, production, promotion, execution, or distribution of the prize competition; all employees, representatives and agents thereof; and all members of the immediate family or household of any such individual, employee, representative, or agent.
4. Any individual or entity that uses Federal funds to develop the proposed solution now or any time in the past, unless such use is consistent with the grant award, or other applicable Federal funds awarding document. NOTE: Submissions that propose to improve or adapt existing federally funded technologies for the solution sought in this prize competition are eligible.

CONSULTATION: Geotechnical engineers, facility managers, and technical specialists from across Reclamation and USACE were consulted in identifying and selecting the topic of this prize competition. Direct and indirect input from various stakeholders and partners associated with the geotechnical engineering program efforts by these agencies were also considered. In addition, the Reclamation maintains an open invitation to the public to suggest prize competition topics at www.usbr.gov/research/challenges.

PUBLIC DISCLOSURE: InnoCentive, Inc. is administering this challenge under a challenge support services contract with Reclamation. Participation is conditioned on providing the data required on InnoCentive's online registration form. Personal data will be processed in accordance with InnoCentive's Privacy Policy which can be located at

<http://www.innocentive.com/privacy.php>. Before including your address, phone number, e-mail address, or other personal identifying information in your proposal, you should be aware that the Seeker is under no obligation to withhold such information from public disclosure, and it may be made publicly available at any time. Neither InnoCentive nor the Seeker is responsible for human error, theft, destruction, or damage to proposed solutions, or other factors beyond its reasonable control. Solver assumes any and all risks and waives any and all claims against the Seeker and its related entities, except in the case of willful misconduct, for any injury, death, damage, or loss of property, revenue, or profits, whether direct, indirect, or consequential, arising from participation in this competition, whether the injury, death, damage, or loss arises through negligence or otherwise.

Dated: March 28, 2016.

David Raff,
Science Advisor

[FR Doc. 2016-07275 Filed: 3/30/2016 8:45 am; Publication Date: 3/31/2016]